Board of Forestry and Fire Protection

"Cumulative Impacts Assessment Checklist, Technical Rule Addendum No. 2 and Appendix Amendments"

Title 14 of the California Code of Regulations,

Division 1.5, Chapter 4,

Subchapter 1, Article 1

Subchapters 4, 5, & 6, Article 2

Amend:

§ 895 Abbreviations Applicable Throughout Chapter

§ 895.1 Definitions

§ 912.9 [932.9, 952.9] Cumulative Impacts Assessment Checklist

§ 895 Abbreviations Applicable Throughout Chapter

*******ft** foot or feet

GHG Greenhouse Gas *****

*****Note: Authority cited: Sections 4551, 4551.5 and 21082, Public Resources Code. Reference: Sections 4511, 4512, 4512.5, 4513, 4521.3, ~~4522, 4522.5,~~ 4523-4525, 4525.3, 4525.5, 4525.7, 4526, 4526.5, 4527, 4527.5, 4528, 4551, 4551.5, 4552, 4582, 4750, 4750.3 4750.4 and 21080.5, Public Resources Code.*****

*****

§ 895.1 Definitions

********* "Dying Trees" means trees which exhibit one or more of the following: fifty percent or more of the foliage-bearing crown is dead or fading in color from a normal green to yellow, sorrel, or brown, excluding normal autumn coloration changes; successful bark beetle attacks with indications of dead cambium and brood development distributed around the circumference of the bole; seventy-five percent or more of the circumference of the lower bole is girdled by wildlife; or trees designated by an RPF as likely to die within one year.

"Effects" means Effects and ~~i~~Impacts as defined in 14 CCR § 15358. *********

*********"Hydrologic Disconnection" means the removal of direct routes of drainage or overland flow of road runoff to a Watercourse or Lake.

"Impacts" means Effects and Impacts as defined in 14 CCR § 15358. *********

*********"Nest Site" means the geographic area and surrounding habitat that includes the Nest Tree(s), Perch Tree(s), screening tree(s), and Replacement Tree(s) of a bird Species of special concern.

"Nest Tree" means the tree, Snags, or other structure that contains the nest of a ~~Species of special concern~~Sensitive Species. *********

*********Note: Authority cited: Sections 4551, 4551.5, 4553, 4561, 4561.5, 4561.6, 4562, 4562.5, 4562.7 and 4591.1, Public Resources Code. Reference: Sections 4511, 4512, 4512.5, 4513, 4521.3, 4523, 4524, 4525, 4525.3, 4525.5, 4525.7, 4526, 4526.5, 4527, 4527.5, 4528, 4551, 4551.5, 4561 ~~4561.6~~, 4562, 4562.5, 4562.7, 4583.2, 4584, 4591.1

4597.1, 21001(f), 21080.5, 21083.2 and 21084.1, Public Resources Code; CEQA Guidelines Appendix K (printed following Section 15387 of Title 14 Cal. Code of Regulations), *Laupheimer v. State* (1988) 200 Cal.App.3d 440; 246 Cal.Rptr. 82 and *Joy Road Area Forest and Watershed Association, v. California Department of Forestry & Fire Protection*, Sonoma County Superior Court No. SCV 229850.

§ 912.9 [932.9, 952.9] Cumulative Impacts Assessment Checklist

STATE OF CALIFORNIA BOARD OF FORESTRY AND FIRE PROTECTION

CUMULATIVE IMPACTS ASSESSMENT

(1a) Do the assessment area(s) of resources that may be affected by the proposed pProject contain any Past Projects or Reasonably Foreseeable Probable Future Projectspast, present, or reasonably foreseeable probable future projects? Yes ___ No___

If the answer is yes, identify the pProject(s) and affected resource subject(s).

(2b) Are there any continuing, significant adverse iImpacts from past land use activities within the assessment area(s) that may add to the iImpacts of the proposed pProject? Yes ___ No ___

If the answer is yes, identify the activities, describing their location, iImpacts and affected resource subject(s).

(3c) Will the proposed pProject, as presented, in combination with pastProjects or Reasonably Foreseeable Probable Future Projects, present, and reasonably foreseeable probable future projects identified in items (1a) and (2b) above, have a reasonable potential to cause or add to significant adverse cCumulative iImpacts in any of the following resource subjects?

Resource Subjects	Yes after mitigation (a1)	No after mitigation (b2)	No reasonably potential significant adverse effectsImpacts (c3)
(A)1. Watershed			
(B)2. Soil Productivity			
(C)3. Biological			
(D)4. Recreation			
(E)5. Visual			
(F)6. Traffic			
(G)7. OtherGreenhouse Gases (GHG)			
(H) Wildfire Risk and Hazard			
(I) Other			

a)(1) "Yes after mitigation", means that potential significant adverse cCumulative iImpacts are left after application of the forest practice rulesRules and mitigations or alternatives proposed by the pPlan submitter.

b)(2) "No after mitigation" means that any potential for the proposed tTimber oOperation to cause or add to significant adverse cCumulative iImpacts by itself

or in combination with other ~~p~~Projects has been reduced to insignificance or avoided by mitigation measures or alternatives proposed in the ~~THP~~Plan and application of the ~~forest practice rules~~Rules.

~~c~~)(3) "No reasonably potential significant adverse ~~cumulative effects~~Impacts" means that the operations proposed under the ~~THP~~Plan and application of the Rules do not have a reasonable potential to join with the ~~i~~Impacts of any other ~~p~~Project to cause, add to, or constitute significant adverse ~~c~~Cumulative ~~i~~Impacts.

Note: Guidance on evaluating Impacts to resource subjects are provided within the Appendix to Technical Rule Addendum No. 2.

(4d) If column (~~a~~1) is checked in (~~3~~c) above, describe why the expected ~~i~~Impacts cannot be feasibly mitigated or avoided and what mitigation measures or alternatives were considered to reach this determination. If column (~~b~~2) is checked in (~~3~~c) above, describe what mitigation measures or alternatives have been selected which will substantially reduce or avoid reasonably potential significant adverse ~~c~~Cumulative ~~i~~Impacts~~except for those mitigation measures or alternatives mandated by application of the rules of the Board of Forestry~~.

(~~5~~e) Provide a brief description of the assessment area used for each resource subject.

(~~6~~f) List and briefly describe the individuals, organizations, and records consulted in the assessment of ~~c~~Cumulative ~~i~~Impacts for each resource subject. Records of the information used in the assessment shall be provided to the Director upon request.

BOARD OF FORESTRY AND FIRE PROTECTION

TECHNICAL RULE ADDENDUM NO. 2

CUMULATIVE IMPACTS ASSESSMENT

A. Introduction

The purpose of this addendum is to ~~guide~~provide a framework for the assessment of ~~c~~Cumulative ~~i~~Impacts as required in 14 CCR § 898~~and 1034~~ that may occur as a result of proposed ~~t~~Timber ~~o~~Operations. Cumulative Impacts, pursuant to 14 CCR § 15355, refers to two or more individual Effects which, when considered together, are considerable or which compound or increase other environmental Impacts. This assessment shall include evaluation of both on-site and off-site interactions of proposed ~~p~~Project activities with the ~~i~~Impacts of Past Projects and Reasonably Foreseeable Probable Future Projects~~past and reasonably foreseeable future projects~~.

Resource subjects to be considered in the assessment of Cumulative Impacts are listed in 14 CCR § 912.9 [932.9, 952.9](c) and described in greater detail in the Appendix to this Addendum.

In conducting an assessment, the RPF must distinguish between the potential on-site ~~i~~Impacts of the Plan's proposed activities ~~that are mitigated by application of the Forest Practice Rules and the interactions of proposed activities~~ (which may not be significant when considered alone) with ~~i~~Impacts of Past Projects and Reasonably Foreseeable Probable Future Projects ~~past and reasonably foreseeable future projects~~ pursuant to 14 CCR § 15130(b)(1)(A).

~~Resource subjects to be considered in the assessment of cumulative impacts are described in the Appendix.~~

The RPF preparing a ~~THP~~Plan shall conduct an assessment based on information that is reasonably available ~~before~~prior to submission of the ~~THP~~Plan. RPFs ~~are expected to~~ shall submit sufficient information to support their findings if significant issues are raised during the Department's review of the ~~THP~~Plan.

Information used in the assessment of ~~c~~Cumulative ~~i~~Impacts may be supplemented during the ~~THP~~Plan review period. Agencies participating in ~~plan~~Plan review may provide input into the ~~c~~Cumulative ~~i~~Impacts assessment based upon their area of expertise. Agencies ~~should~~ shall justify and support their recommendations with documentation.

The Department, as lead agency, shall make the final determination regarding assessment sufficiency and the presence or absence of significant adverse ~~c~~Cumulative ~~i~~Impacts. This determination shall be based on a review of all sources of information provided and developed during review of the ~~Timber Harvesting~~Plan.

B. Identification of Assessment~~Resource~~ Areas

The RPF shall establish and briefly describe the ~~geographic~~assessment area within or surrounding the ~~p~~Plan for each resource subject~~to be assessed~~ and shall briefly explain the rationale for establishing the assessment~~resource~~ area. This shall be a narrative description and each established assessment area shall be shown on a map when a map adds clarity ~~to the assessment~~.

C. Identification of Information Sources

The RPF who prepares the Plan shall obtain information from Plan submitters (Timberland or Timber Owner), appropriate agencies, landowners, and individuals about past, and future land management activities. The RPF shall list and briefly describe the individuals, organizations, and records ~~used~~ relied upon as sources of information in the assessment of ~~c~~Cumulative ~~i~~Impacts, including references for listed records and the names, affiliations, and contact information ~~addresses, and phone numbers~~ of specific individuals contacted. Records of information used in the assessment shall be provided to the Director upon request.

Common sources of information for the assessment of ~~c~~Cumulative ~~effects~~Impacts ~~assessment~~ are identified below. Sources to be used will depend upon the complexity of individual situations and the amount of information available from other ~~p~~Plans. Sources not listed below may have to be consulted based on individual circumstances. Not all sources of information need to be consulted for every ~~THP~~ Plan. Additionally, a poll of adjacent landowners is encouraged, and may be required by the Department, to identify past, and future land management activities and significant adverse environmental Impacts on adjacent ownerships.

1. Consultation with Experts and Organizations:

~~(a.)~~ County Planning Department; **~~(b.)~~** Biologists;

~~(c.)~~ Geologists; **~~(d.)~~** Soil ~~S~~scientists;

~~(e.)~~ Hydrologists; **~~(f.)~~** Federal ~~A~~agencies;

~~(g.)~~ State ~~A~~agencies; **~~(h.)~~** Public and private utilities.

2. Records Examined:

(a.) Soil ~~M~~maps; **(b.)** Geology ~~M~~maps;

(c.) Aerial ~~P~~photographs; **(d.)** Natural Diversity Data Base;

(e.) ~~THP~~Plan ~~R~~records; **(f.)** Special ~~E~~environmental ~~R~~reports;

(g.) Topographic maps; ~~Basin Plans;~~ **(h.)** Basin plans; ~~Fire History Maps;~~

(i.) Fire history maps; ~~Relevant Federal Agency Documents or Plans;~~

j. Relevant public agency documents or plans;

k. Relevant watershed or wildlife studies (published or unpublished);

l. Available modeling approaches.

~~As provided in Section 898 of the rules, the RPF or supervised designee and the plan submitter must consult information sources that are reasonably available.~~

D. Past Projects and Reasonably Foreseeable Probable~~and~~ Future ~~Activities~~ Projects

Past Projects and Reasonably Foreseeable Probable Future Projects ~~future projects~~ included in the ~~c~~Cumulative ~~i~~Impacts assessment shall be described as follows:

~~**A1.**~~ Identify and briefly describe the location of ~~past and reasonably foreseeable probable future projects~~ Past Projects and Reasonably Foreseeable Probable Future Projects~~as defined in 895.1~~ within ~~described resource~~ assessment areas. Include a map or maps and associated legend(s) clearly depicting the following information:

~~1~~**a.** Township and Range numbers and Section lines.

~~2~~b. Boundary of the ~~planning watershed~~ watershed(s)~~within~~ which the P~~p~~lan area is located along with the CALWATER 2.2 ~~identification~~Planning Watershed number(s).

~~3~~c. Location and boundaries of Past Projects and Reasonably Foreseeable Probable Future Projects ~~past, present and reasonably foreseeable probable future timber harvesting projects~~ on land owned or controlled by the ~~t~~Timberland owner (of the proposed timber harvest) within the ~~planning~~Planning ~~watershed~~Watershed(s) depicted in ~~section~~provision ~~(~~2.~~)~~ above. For purposes of this ~~section~~provision, Past Projects~~past projects~~ shall be limited to those ~~p~~Projects submitted within ten years prior to submission of the ~~THP~~Plan.

4d. Silvicultural ~~m~~Methods for each of the Past Projects and Reasonably Foreseeable Probable Future Projects~~timber harvesting projects~~ depicted in ~~section~~provision ~~(~~3.~~)~~ above. Each specific ~~s~~Silvicultural ~~m~~Method must be clearly delineated on the map(s), and associated ~~THP~~Plan number referenced in the legend or an annotated list. In addition, shading, hatching, or labeling shall be used which clearly differentiates ~~s~~Silvicultural ~~m~~Methods into one of the four categories outlined in Table 1.

~~5~~e. A north arrow and scale bar (or scale text).

~~6~~f. Source(s) of geographical information. The map scale shall be large enough to clearly represent one ~~p~~Planning ~~w~~Watershed per page or of a scale not less than 1:63,360. Planning ~~w~~Watersheds with densely situated or overlapping harvest units, or those which are large or irregular in size, may require multiple maps to achieve clarity. Color coding on

maps may be used if they are able to be reproduced in black and white and clearly show all details. A legend shall be included indicating the meaning of the symbols used. Additionally, maps shall be ~~Map(s) shall be reproducible on black & white copiers, and~~ submitted on ~~an~~ 8.5 by~~½ x~~ 11 page(s).

Table 1

Silvicultural Category	**Silvicultural Method**
Evenaged Management 14 CCR § 913.1 [933.1, 953.1]	Clearcutting, Seed Tree Seed Step, Seed Tree Removal Step, Shelterwood Preparatory Step, Shelterwood Seed Step, Shelterwood Removal Step
Unevenaged Management 14 CCR § 913.2 [933.2, 953.2]	Selection, Group Selection, Transition
Intermediate Treatments 14 CCR § 913.3 [933.3, 953.3]	Commercial Thinning, Sanitation-Salvage
Special Prescriptions and Other Management	Special Treatment Area Prescriptions, Rehabilitation of Understocked Area Prescription, Fuelbreak/Defensible Space, Southern Subdistrict

14 CCR § 913.4 [933.4, 953.4]	Special Harvesting Method (14 CCR § 913.8), Variable Retention, Conversion
Alternative Prescriptions shall be put into the silvicultural category within which the most nearly appropriate or ~~f~~Feasible ~~s~~Silvicultural ~~m~~Method in the ~~Forest Practice Rules~~Rules is found pursuant to 14 CCR § 913.6 (b)(3)[933.6(b)(3), 953.6(b)(3)].	

~~B~~2. Identify and give the location and description of any known, continuing significant adverse environmental ~~problems~~Impacts caused by ~~past~~Past ~~projects~~ Projects. ~~as defined in 14 CCR § 895.1. The RPF who prepares the plan or supervised designee shall obtain information from plan submitters (timberland or timber owner), and from appropriate agencies, landowners, and individuals about past, and future land management activities and shall consider past experience, if any, in the assessment area related to past impacts and the impacts of the proposed operations, rates of recovery, and land uses.~~ The RPF shall use their knowledge of the assessment areas, if any, regarding past Impacts, Impacts of the proposed operations, rates of recovery and land uses. ~~A poll of adjacent land owners is encouraged and may be required by the Director to determine such activities and significant adverse environmental problems on adjacent ownerships.~~

Appendix

Technical Rule Addendum #No. 2

Cumulative Impacts Assessment Guidelines

This Appendix provides guidelines for ~~In~~ evaluating ~~c~~Cumulative ~~i~~Impacts~~,~~ to resource subjects listed in 14 CCR § 912.9 [932.9, 952.9](c)~~the RPF shall consider the factors set forth herein~~. Specifically, for each resource subject, this Appendix includes factors, and in some instances methods for analysis, that can be considered or used when determining if the Project has a reasonable potential to cause or add to significant adverse Cumulative Impacts.

A. Watershed Resources

Cumulative ~~W~~watershed Effects (CWEs) occur within and near bodies of water or ~~significant wet areas~~Wet Meadows or Other Wet Areas, where individual ~~i~~Impacts are combined to produce an effect that is greater than any of the individual ~~i~~Impacts acting alone. Factors to consider in the evaluation of ~~cumulative watershed impacts~~CWEs ~~are~~ include those listed below. The factors described are general and may not be appropriate for all situations and in some cases, actual measurements may be required if needed to evaluate significant adverse Effects. The evaluation of Impacts to watershed resources is based on significant adverse on-site and off-site Cumulative Impacts on Beneficial Uses. Additionally, the Plan must comply with the quantitative or narrative water quality objectives set forth in an applicable Water Quality Control Plan.

~~**1.** Impacts to watershed resources within the Watershed Assessment Area (WAA) shall be evaluated based on significant on-site and off-site cumulative effects on beneficial uses of water, as defined and listed in applicable Water Quality Control Plans..~~

12. Watershed ~~e~~Effects produced by timber harvest and other activities, which may include one or more of the following:

~~Sediment~~

~~Water temperature~~

~~Organic debris~~

~~Chemical contamination~~

~~Peak flow~~

~~The following general guidelines shall be used when evaluating watershed impacts. The factors described are general and may not be appropriate for all situations. Actual measurements may be required if needed to evaluate significant environmental effects. The plan must comply with the quantitative or narrative water-quality objectives set forth in an applicable Water Quality Control Plan.~~

a. Sediment Effects. Sediment-induced CWEs occur when earth materials transported by surface or mass wasting erosion enter a ~~stream~~Watercourse or ~~stream~~Watercourse system at separate locations and are then combined at a downstream location to produce a change in water quality or channel condition. The eroded materials can originate from the same or different ~~p~~Projects. ~~Potentially adverse changes are most likely to occur in the following locations and situations:~~Sediment is composed of both suspended and bedload material. Suspended sediment is usually the primary source of turbidity in forested watersheds, although suspended organic material also accounts for a proportion of the suspended load. Chronic turbidity can be an indicator of a Cumulative Impact when sources can be identified and linked to one or more Projects.

Both turbidity and suspended sediment concentrations are subject to extreme inherent variability from region to region, storm to storm, and from year to year, dependent upon underlying geology and precipitation. Potentially adverse Impacts are most likely to occur in the following locations and situations:

- Downstream areas of ~~reduced~~low ~~stream~~Watercourse gradient where sediment from a new source may be deposited in addition to sediment derived from existing or other new sources.
- Immediately downstream from where sediment from a new source is combined with sediment from other new or existing sources and the combined amount of sediment exceeds the transport capacity of the ~~stream~~Watercourse.
- Any location where sediment from new sources in combination with suspended sediment from existing or other new sources significantly increases turbidity, reduces the survival of fish or other aquatic organisms, or otherwise reduces the ~~q~~Quality of ~~w~~Waters used for domestic, agricultural, or other ~~b~~Beneficial ~~u~~Uses.
- Channels with relatively steep gradients which contain accumulated sediment and debris that can be mobilized by sudden new sediment inputs, such as debris flows, resulting in debris torrents and severe channel scouring.

Potentially significant adverse ~~i~~Impacts of cumulative sediment inputs may include:

- Increased treatment needs or reduced suitability for domestic, municipal, industrial, or agricultural water use.

- Direct mortality of fish and other aquatic species.
- Impaired spawning and rearing habitat for salmonids or otherwise reduced viability of aquatic organisms or disruption of aquatic habitats and loss of streamWatercourse productivity caused by filling of pools and plugging or burying gravel.
- Accelerated channel filling (aggradation) resulting in loss of streamside vegetation and streamWatercourse migration that can cause accelerated bank erosion.
- Accelerated channel filling (aggradation) resulting in increased frequency and magnitude of overbank flooding.
- Accelerated filling of downstream reservoirs, navigable channels, water diversion and transport facilities, estuaries, and harbors.
- Channel scouring by debris flows and torrents.
- Nuisance to or reduction in water related recreational activities.

Situations where sediment production potential is greatest include:

- Sites with high or extreme eErosion hHazard rRatings.
- Sites which are tractor logged on steep slopes.
- Unstable aAreas.

b. Water Temperature Effects. Water temperature-related CWEs are changes in water chemistry or biological properties caused by the combination of solar-warmed water from two or more locations (in contrast to an individual effect that results from iImpacts along a single Class I or II Watercoursestream segment) where natural cover has been removed. Cumulative changesImpacts infrom water temperature are most likely to occur in the following situations:

-• Where Class I or II Watercoursestream bottom materials are dark in color.

-• Where water is shallow and has little underflow.

-• Where removal of streamside cCanopy results in substantial, additional solar exposure or increased contact with warm air at two or more locations along a Class I or II Watercoursestream.

-• Where removal of streamside cCanopy results in substantial, additional solar exposure or increased contact with warm air at two or more Class I or II Watercoursesstreams that are tributary to a larger Class I or II Watercoursestream.

-• Where water temperature is near a biological threshold for specific sSpecies.

Significant adverse iImpacts of cumulative temperature increases include:

-• Increases in the metabolic rate of aquatic sSpecies.

-• Direct increases in metabolic rate and/or reduction of dissolved oxygen levels, either of which can cause reduced vigor and death of sensitive fish and other sensitive aquatic organisms.

-• Increased growth rates of microorganisms that deplete dissolved oxygen levels or increased disease potential for organisms.

-•Class I or II Watercoursestream biology shifts toward warmer water ecosystems.

c. Organic Debris Effects. CWEs produced by organic debris can occur when logs, limbs, and other organic material are introduced into a streamWatercourse or lLake at two or more locations. Decomposition of this debris, particularly the smaller sized and less woody material, removes

dissolved oxygen from the water and can cause ~~i~~Impacts similar to those resulting from increased water temperatures. Introduction of excessive small organic debris can also increase water acidity. Conversely, ~~L~~large organic debris is an important stabilizing agent~~ that should be maintained~~ in small to medium size, steep gradient channels.~~, but~~However, the sudden introduction of large, unstable volumes of ~~bigger~~ debris (such as logs, chunks, and larger limbs produced during a logging operation) can obstruct and divert streamflow against erodible banks, block fish migration, and may cause debris torrents during periods of high flow. Additionally, ~~R~~removing streamside vegetation can reduce the natural, annual inputs of litter to the ~~stream~~Watercourse~~(after decomposition of logging-related litter.)~~. This can cause both a drop in food supply, and resultant productivity, and a change in types of food available for organisms that normally dominate the lower food chain of ~~streams~~Watercourses with an overhanging or adjacent forest ~~c~~Canopy.

d. Chemical Contamination Effects. Potential sources of chemical CWEs include run-off from roads treated with oil or other dust-retarding materials, direct application or run-off from pesticide treatments, contamination by equipment fuels and oils, and the introduction of nutrients released during ~~slash~~ burning of Slash and Woody Debris or wildfire from two or more locations.

e. Peak Flow Effects. CWEs can be caused by management~~-~~ induced peak flow increases in ~~streams~~Watercourses during storm events~~.are difficult to anticipate.~~ Peak flow increases may result from management activities that reduce rainfall interception (i.e., evaporation) and vegetative

water use (i.e., transpiration), or produce openings where snow can accumulate, ~~(~~such as ~~clear-cutting~~in clearcuts and ~~site preparation~~on roads and Landings). ~~or that change the timing of flows by producing more efficient runoff routing (such as insloped roads). These~~ While increases, if any ~~however~~, are likely to be small relative to pre-harvest~~natural~~ peak flows, extensive Canopy removal over a short period of time on a watershed scale can increase peak flow Effects on streambank erosion, channel incision, and headward channel extension in erodible landscapes. ~~from medium and large storms. Research to date on the effects of management activities on channel conditions indicates that channel changes during storm events are primarily the result of large sediment inputs.~~ The timing and concentration of flows affecting lower order Watercourse channel morphology can also be affected by the routing of runoff from roads, Landings, and skid trails. Peak flow Effects diminish with decreasing intensity of Canopy removal, increasing time since harvest, and during larger flow recurrence intervals.

2~~3~~. Watercourse Condition. The watershed ~~i~~Impacts of past upstream and on-site ~~p~~Projects are often reflected in the condition of ~~stream~~Watercourse channels on the ~~p~~Project area. The ~~F~~following is a list of channel characteristics and factors commonly~~that may be~~ used to describe current watershed conditions and to assist in the evaluation of potential ~~p~~Project ~~i~~Impacts:

a. Gravel Embedded - Spaces between ~~stream~~gravel filled with sand or finer sediments. Gravel are often in a tightly packed arrangement.

b. Pools Filled - Former pools or apparent pool areas filled with sediments leaving few areas of deep or "quiet" water relative to ~~stream~~Watercourse flow or size.

c. Aggrading - ~~Stream~~Watercourse channels filled or filling with sediment that raises the channel bottom elevation. Pools will be absent or greatly diminished and gravel may be embedded or covered by finer sediments. Streamside vegetation may be partially or completely buried, and the ~~stream~~Watercourse may be meandering or cutting into its banks above the level of the former streambed. Depositional areas in aggrading channels are often increasing in size and number.

d. Bank Cutting - Can either be minor or severe and is indicated by areas of fresh, unvegetated soil or alluvium exposed along the ~~stream~~Watercourse ~~b~~Banks, usually above the low-flow channel and often with a vertical or undercut face. Severe bank cutting is often associated with channels that are downcutting, which can lead to over-steepened banks, or aggrading, which can cause the channel to migrate against slopes that were previously above the high flow level of the ~~stream~~Watercourse.

e. Bank Mass Wasting - Channels with landslides directly entering the ~~stream~~Watercourse system. Slide movement may be infrequent (single events) or frequent (continuing creep or periodic events).

f. Downcutting - Incised ~~stream~~Watercourse channels with relatively clean, uncluttered beds cut below the level of former streamside vegetation and with eroded, often undercut or vertical, banks.

g. Scoured - ~~stream~~Watercourse channels that have been stripped of gravel and finer bed materials by large flow events or debris torrents. Streamside vegetation has often been swept away, and the channel has a raw, eroded appearance.

h. Organic Debris - Debris in the ~~w~~Watercourse can have either a positive or negative ~~i~~Impact~~s~~ depending on the amount and stability of the material. Some stable organic debris present in the ~~w~~Watercourse helps to form pools and retard sediment transport and downcutting in small to medium sized ~~streams~~Watercourses with relatively steep gradients. Conversely, ~~L~~large accumulations of organic debris can block fish passage, block or divert ~~stream~~Watercourse flow, or could be released as a debris flow.

i. Stream-~~S~~side Vegetation – Stream~~-S~~side ~~vegetation~~ and adjoining~~near-stream~~ vegetation provide shade or cover to the ~~stream~~Watercourse, which may have an ~~i~~Impact~~s~~ on water temperature, and provide~~s~~ root systems that stabilize streambanks and floodplains and filter sediment from ~~f~~Flood ~~f~~Flows.

j. Recent Floods - A recent high flow event that would be considered unusual in the ~~p~~Project area may have an ~~i~~Impacts on the current ~~w~~Watercourse condition.

B. Soil Productivity

Cumulative soil productivity ~~i~~Impacts occur when the ~~e~~Effects of two or more activities, from the same or different ~~p~~Projects, combine to produce a significant decrease in soil biomass production potential. These ~~i~~Impacts most often occur on-site within the ~~p~~Project boundary, and the relative severity of productivity losses for a given level of ~~i~~Impact generally increases as site quality declines. ~~The primary factors influencing soil productivity that can be affected by timber operations include:~~

~~○Organic matter loss.~~ ~~○Surface soil loss.~~

~~○Soil compaction.~~ ~~○Growing space loss.~~

~~The following general guidelines may be used when evaluating soil productivity impacts.~~ Factors to consider in the evaluation of cCumulative iImpacts influencing soil productivity are listed below.:

1. Organic Matter Loss. Displacement or loss of organic matter can result in a long-term loss of soil productivity. Soil surface litter and downed wood~~woody debris~~ are the store-house of long term soil fertility, provide for soil moisture conservation, and support soil microorganisms that are critical in the nutrient cycling and uptake process. Much of the chemical and microbial activity of the forest nutrient cycle is concentrated in the narrow zone at the soil and litter interface.

Displacement of surface organic matter occurs as a result of ~~s~~Skidding, ~~m~~Mechanical ~~s~~Site ~~p~~Preparation, and other land disturbing ~~t~~Timber ~~o~~Operations. Actual loss of organic matter occurs as a result of burning or erosion. The effects of organic matter loss on soil productivity may be expressed in terms of the percentage displacement or loss as a result of all ~~p~~Project activities.

2. Surface Soil Loss. The soil is the store-house of current and future site fertility, and the majority of nutrients are held in the upper few inches of the soil profile. Topsoil displacement or loss can have an immediate effect on site productivity, although ~~e~~Effects may not be obvious because of reduced brush competition and lack of side-by-side comparisons or until the new stand begins to fully occupy the available growing space.

Surface soil is primarily lost by erosion or by displacement into windrows, piles, or ~~f~~Fills. Mass wasting is a special case of erosion with obvious extreme effects on site productivity. The ~~i~~Impacts of surface soil loss may be evaluated by estimating the proportion of the ~~p~~Project area affected and the depth of loss or displacement.

3. Soil Compaction. Compaction affects site productivity through loss of large soil pores that transmit air and water in the soil and by restricting root penetration. The risk of compaction is associated with:

a. Depth of surface litter.

b. Soil structure.

c. Soil organic matter content.

d. Presence and amount of coarse fragments in the soil.

e. Soil texture.

f. Soil moisture status.

Compaction ~~e~~Effects may be evaluated by considering the soil conditions, as listed above, at the time of harvesting activities and the proportion of the ~~p~~Project area subjected to compacting forces.

4. Growing Space Loss. Forest growing space is lost to roads, ~~l~~Landings, permanent skid trails, and other permanent or non-restored areas subjected to severe disturbance and compaction.

The ~~e~~Effects of growing space loss may be evaluated by considering the overall pattern of roads, etc., relative to ~~f~~Feasible ~~s~~Silvicultural ~~s~~Systems and ~~y~~Yarding methods.

C. Biological Resources

Significant adverse Cumulative Impacts may be expected where there is a substantial reduction in required habitat or the Project will result in substantial interference with the movement of resident or migratory Species. Biological assessment areas can~~will~~ vary with the habitat and ~~s~~Species being evaluated~~ and its habitat~~. Factors to consider in the evaluation of cumulative biological ~~i~~Impacts include:

1. Any known Listed Species~~rare, threatened, or endangered species or sensitive species (as described in the Forest Practice Rules)~~ that may be directly or indirectly affected by ~~p~~Project activities. ~~Significant cumulative effects on listed species may be expected from the results of activities over time which combine to have a substantial effect on the species or on the habitat of the species.~~

2. Any significant, known wildlife or fisheries resource concerns within the immediate ~~p~~Project area and the biological assessment area (e.g. loss of oaks creating forage problems for a local deer herd, ~~s~~Species requiring special elements, ~~sensitive species,~~ and significant natural areas). ~~Significant cumulative effects may be expected where there is a substantial reduction in required habitat~~

~~or the project will result in substantial interference with the movement of resident or migratory species.~~

The ~~S~~significance of ~~c~~Cumulative ~~i~~Impacts on non-listed ~~s~~Species viability ~~should~~ may be determined relative to the benefits to other non-listed ~~s~~Species. For example, the manipulation of habitat results in conditions which discourage the presence of some ~~s~~Species while encouraging the presence of others.

3. The aquatic and near-water habitat conditions ~~on~~within the ~~THP~~Plan and immediate surrounding area. Habitat conditions of major concern are: Pools and riffles~~.~~., ~~L~~large woody material in the ~~stream~~Watercourse~~.~~., and ~~N~~near-water vegetation. Much of the information needed to evaluate these factors is described in the ~~preceding W~~watershed ~~R~~resources provision~~section~~. A general discussion of their importance is~~given~~ provided below:

a. Pools and Riffles. Pools and riffles affect overall habitat quality and fish community ~~s~~Structure. ~~Streams~~Watercourses with little structural complexity offer poor habitat for fish communities as a whole, even though the channel may be stable. Structural complexity is often lower in ~~Streams~~Watercourses with low gradients, and filling of pools can reduce ~~stream~~Watercourse productivity.

b. Large Woody Material. Large woody material~~debris~~ in ~~the stream~~Watercourses play~~s~~ an important role in creating and maintaining habitat through the formation of pools. These pools comprise important feeding locations that provide maximum exposure to drifting food organisms in relatively quiet water. Removal of large woody ~~debris~~material can reduce frequency and quality of pools.

c. Near-~~W~~water Vegetation. Near-water vegetation provides many habitat benefits, including: shade, nutrients, vertical diversity, migration corridors, nesting, roosting, and escape. Recruitment of large woody material is also an important element in maintaining habitat quality.

4. The biological habitat condition of the ~~THP~~Plan and immediate surrounding area. ~~Significant factors to consider are:~~

~~Snags/den trees~~

~~Downed, large woody debris~~

~~Multistory canopy~~

~~Road density~~

~~Hardwood cover~~

~~Late seral (mature) forest characteristics~~

~~Late seral habitat continuity~~

The following ~~general guidelines~~ factors ~~may be~~are commonly used when evaluating biological habitat. The factors described are general and may not be appropriate for all situations. The RPF~~THPPlan preparer must also be alert to the~~may also need to consider factors which are not listed below. Each set of ground conditions are unique and the ~~analysis~~assessment conducted must reflect those conditions.

a. Snags/Den Trees/Nest Trees: Snags, den trees, ~~n~~Nest ~~t~~Trees and their recruitment are required elements in the overall habitat needs of more than 160 wildlife ~~s~~Species. Many of these ~~s~~Species play a vital role in maintaining the overall health of ~~t~~Timberlands. Snags of greatest value are >16~~"~~ in. ~~DBH~~dbh and 20 ft. in height. The degree of ~~s~~Snag

recruitment over time ~~should~~ may be considered. Den trees are partially live trees with elements of decay which provide wildlife habitat. Nest ~~t~~Trees have importance to birds classified as ~~a~~ ~~s~~Sensitive ~~s~~Species.

b. Downed ~~l~~Large~~,~~ ~~w~~Woody ~~debris~~Material: Large downed logs (particularly conifers) in the upland and near-water environment in all stages of decomposition provide an important habitat for many wildlife ~~s~~Species. Large woody ~~debris~~material of greatest value consists of downed logs >16~~"~~ in. diameter at the large end and >20 f~~eet~~t. in length.

c. Multistory ~~c~~Canopy: Upland multistoried canopies have a marked influence on the diversity and density of wildlife ~~s~~Species utilizing the area. More productive ~~t~~Timberland is generally of greater value and timber site capability ~~should~~ may be considered as a factor in an assessment. The amount of upland multistoried ~~c~~Canopy may be evaluated by estimating the percent of the stand composed of two or more tree layers on an average per-acre basis.

Near-water multistoried canopies in ~~r~~Riparian zones that include conifer and hardwood tree ~~s~~Species provide an important element of structural diversity to the habitat requirements of wildlife. Near-water multistoried ~~c~~Canopy may be evaluated by estimating the percentage of ground covered by one or more ~~vegetative c~~Canopy strata, with more emphasis placed on shrub ~~s~~Species along Class III and IV ~~streams~~Watercourses (14 CCR §§ 916.5, 936.5, or 956.5).

d. Road Density: Frequently traveled ~~permanent and secondary~~ roads have a significant influence on wildlife use of otherwise suitable habitat. ~~Large d~~Declines in deer and bear use of areas adjacent to open roads

are frequently noted. Road density influence on large mammal habitat may be evaluated by estimating the miles of ~~open permanent and temporary~~roads, on a per-section basis, that ~~receive some level of maintenance and~~are open to the public. This assessment ~~should~~can also account for the ~~e~~Effects of vegetation screening and the relative importance of an area to wildlife on a seasonal basis (e.g. winter range).

e. Hardwood Cover: Hardwoods are an important habitat component in Cumulative Impact assessment, because they often provide Snags, den trees, downed large woody material, multistory Canopy, cover, mast, late seral forest characteristics, and connectivity between habitats. Hardwoods provide an important element of habitat diversity in the coniferous forest and are utilized as a source of food and/or cover by a large proportion of the state's bird and mammal ~~s~~Species. Productivity of deer and other ~~s~~Species has been directly related to mast crops. Hardwood cover can be estimated using the ~~b~~Basal ~~a~~Area ~~p~~Per ~~a~~Acre provided by hardwoods of all ~~s~~Species.

[Northern and Southern only]: ~~Post-harvest deciduous oak retention for the maintenance of habitats for mule deer and other hardwood-associated wildlife shall be guided by the Joint Policy on Hardwoods between the California Board of Forestry and California Fish and Game Commission (5/9/94).~~ To sustain and optimize wildlife habitat, a diversity of stand structural and seral conditions, and tree size and age classes of deciduous oaks should be retained in proportions that are ecologically sustainable. Regeneration and recruitment of young deciduous oaks ~~should~~can ~~be sufficient~~, over time, ~~to~~ replace mortality of older trees.

Deciduous oaks ~~should be~~ present in sufficient quality and quantity, and in appropriate locations ~~to~~ provide ~~f~~Functional habitat elements for hardwood-associated wildlife.

In general, larger hardwoods are more valuable to a greater diversity of wildlife than smaller hardwoods.

f. Late Seral (Mature) Forest Characteristics:

Determination of the presence or absence of late seral (mature) forest~~mature and over-mature forest stands and their structural~~ characteristics provides a basis from which to begin an assessment of the influence of management on associated wildlife. These characteristics include large trees as part of a multilayered ~~c~~Canopy, large decadent trees, and the presence of large numbers of ~~s~~Snags and downed logs, all of which ~~that~~ contribute to an increased level of stand decadence and complexity. Late seral ~~stage~~ forest~~s amount~~ may be evaluated by estimating the percentage of the land base within the Plan~~project~~ and the biological assessment area occupied by areas conforming to the following definitions:

- Forests not previously harvested that are~~should be~~ at least 80 acres in size to maintain the effects of edge. This acreage is variable based on the degree of similarity in surrounding areas. The stand~~area should~~ include~~s~~ a multi-layered ~~c~~Canopy, two or more tree ~~s~~Species with several large coniferous trees per acre (smaller subdominant trees may be either conifers or hardwoods), large conifer ~~s~~Snags, and an abundance of large woody ~~debris~~material .

• Previously harvested forests that are in many possible stages of succession and may include remnant patches of late seral ~~stage~~ forest which generally conform to the definition of unharvested forests but do not meet the acreage criteria.

g. Late Seral Habitat Continuity: ~~Projects containing areas meeting the definitions for late seral stage characteristics must be evaluated for late seral habitat continuity.~~ The fragmentation and resultant isolation of late seral habitat types is one of the most significant factors influencing the sustainability of wildlife populations not adapted to edge environments.

This fragmentation may be evaluated by estimating the ~~amount of the on-site~~number of acres within both the ~~p~~Project area, ~~and~~ as well as the biological assessment area occupied by portions of or entire late seral stands ~~greater than~~at least 80 acres in size (considering the mitigating influence of adjacent and similar habitat, if applicable) and less than one mile apart or connected by a corridor of similar habitat.

h. Special Habitat Elements:

~~The loss of a key habitat element may have a profound effect on a species even though the habitat is otherwise suitable. Each species may have several key limiting factors to consider. For example, a special need for some large raptors is large decadent trees/snags with broken tops or other features. Deer may have habitat with adequate food and cover to support a healthy population size and composition but dependent on a few critical meadows suitable for fawning success. These and other key elements may need special protection.~~Special

habitat elements are specific physical and biological attributes of the landscape without which, certain Species are not expected to be present, or if present, are at relatively low population numbers. The biological assessment area may contain special habitat or critical Functional elements that are not otherwise discussed within this Appendix (e.g., meadows that may be critical for fawning success of local deer population, etc…). Each Species may have several key limiting factors to consider and these factors may require consideration during the assessment of Cumulative Impacts.

D. Recreational Resources~~:~~

The recreational assessment area is generally the area that includes the ~~l~~Logging ~~a~~Area plus 300 feet.

~~To assess recreational cumulative impacts~~Factors to consider in assessing recreational Cumulative Impacts include:

1. ~~Identify t~~The recreational activities involving significant numbers of people in and within 300 f~~ee~~t. of the ~~l~~Logging ~~a~~Area (e.g., fishing, hunting, hiking, picnicking, camping).

2. ~~Identify a~~Any recreational Special Treatment Areas described in the ~~Board of Forestry r~~Rules on the ~~p~~Plan area or contiguous to the area.

E. Visual Resources~~:~~

The visual assessment area is generally the ~~logging~~Project area that is readily visible to significant numbers of people who are no further than three miles from the Project

area~~timber operation~~. ~~To assess visual cumulative effects~~Factors to consider in the assessment of visual Cumulative Impacts include:

1. ~~Identify a~~Any Special Treatment Areas designated as such by the Board ~~of Forestry~~ because of their visual values.

2. ~~Determine h~~How far from the proposed Project area~~timber operation~~ is ~~from~~ the nearest point that significant numbers of people can view the Project area~~timber operation~~. At distances of greater than 3 miles from viewing points~~,~~ activities are not easily discernible and will be less significant.

3. ~~Identify t~~The manner in which the public identified in 1 and 2 above will view the proposed ~~t~~Timber ~~o~~Operation (from a vehicle on a public road, from a stationary public viewing point or from a pedestrian pathway).

F. Vehicular Traffic Impacts~~:~~

The traffic assessment area involves the first roads not part of the ~~l~~Logging ~~a~~Area on which logging traffic must travel. Factors ~~T~~to consider in assessing traffic ~~c~~Cumulative Impacts~~seffects~~ include:

1. ~~Identify w~~Whether any publicly owned roads will be used for the transport of wood products.

2. ~~Identify a~~Any ~~p~~Public ~~r~~Roads that have not been used recently for the transport of wood products and will be used to transport wood products from the proposed ~~t~~Timber Operations~~harvest~~.

3. ~~Identify a~~Any ~~p~~Public ~~r~~Roads that have existing traffic or maintenance problems.

4. ~~Identify h~~How the logging vehicles used in the ~~t~~Timber ~~o~~Operation will change the amount of traffic on ~~p~~Public ~~r~~Roads, especially during heavy traffic conditions.

G. Greenhouse Gas (GHG) Impacts

Forest management affects GHG sequestration and emission rates of forests to the extent management activities affect forest inventory, growth, yield, and mortality. Timber Operations and subsequent production of wood products, and in some instances energy, can result in the emission, storage, and offset of GHGs. Any one or a combination of the following options can be used to assess the potential for significant adverse cumulative GHG Effects:

1. Incorporation by reference, or tiering from, a programmatic assessment that was certified by the Board, CAL FIRE, or other State Agency, which analyzes the net Effects of GHG associated with forest management activities.

2. Application of a model or methodology quantifying an estimate of GHG emissions resulting from the Project. The model or methodology should at a minimum consider the following:

a. Inventory, growth, and harvest over a specified planning horizon

b. Projected forest carbon sequestration over the planning horizon

c. Timber Operation related emissions originating from logging equipment and transportation of logs to manufacturing facility

d. GHG emissions and storage associated with the production and life cycle of manufactured wood products.

3. A qualitative assessment describing the extent to which the Project in combination with Past Projects and Reasonably Foreseeable Probable Future Projects may increase or reduce GHG emissions compared to the existing environmental setting. Such assessment should disclose if a known 'threshold of significance' (14 CCR § 15064.7) for the Project type has been identified by the Board, CAL FIRE or other State Agency, and if so, if the Project's emissions in combination with other forestry Projects are anticipated to exceed this threshold.

H. Wildfire Risk and Hazard

Cumulative increase in wildfire risk and hazard can occur when the Effects of two or more activities from the same or different Projects combine to produce a significant increase in forest fuel loading in the vicinity of residential dwellings and communities.

The following elements may be considered in the assessment of potential Cumulative Impacts:

1. Fire hazard severity zoning.

2. Existing and probable future fuel conditions including vertical and horizontal continuity of live and dead fuels.

3. Location of known existing public and private Fuelbreaks and fuel hazard reduction activities.

4. Road access for fire suppression resources.

I. Other

Within an assessment area there may be evidence of potential Cumulative Impacts to resource subjects that are not listed elsewhere within this Appendix, but which merit assessment. The assessment of any other resource subjects should focus on the factors and elements pertinent to the assessment of Cumulative Impacts related to those subjects.

Note: Authority cited: Sections 4551, 4551.9, and 21080.5, Public Resources Code. Reference: Sections 4512, 4512.5, 4513, 4551.5, 4551.9, 4582.6, 21000(g), 21002, 21080.5, 21083.01, and 21083.05, Public Resources Code. Natural Resources Defense Council, Inc. v. Arcata Nat. Corp.(1976) 59 Cal.App.3d 959; 131 Cal.Rptr. 172; and Laupheimer v. State(1988) 200 Cal.App.3d 440; 246 Cal.Rptr. 82.